EXHTEV
ISSN: 0891-6152

EXPERIMENTAL HEAT TRANSFER

An International Journal

Vol. 2 1989

EXPERIMENTAL HEAT TRANSFER
An International Journal

EDITORS-IN-CHIEF

G. F. HEWITT
Thermal Hydraulics Division
B392 Harwell Laboratory
UKAEA
Oxfordshire OX11 0RA, England

C. L. TIEN
Department of Mechanical Engineering
University of California
Irvine, California 92717, USA

BOARD OF EDITORS

R. Cheesewright
Queen Mary College
Mile End Road
London E1 4NS, England
convective heat transfer

J. C. Chen
Department of Chemical Engineering
Lehigh University
Bethlehem, Pennsylvania 18015, USA
two-phase flow, fluidized beds

J. M. Delhaye
Centre d'Etudes Nucleaires de Grenoble
Service d'Etudes Thermohydrauliques
85X
38041 Grenoble Cedex, France
two-phase flow measurements

K. Hijikata
Department of Physical Engineering
Tokyo Institute of Technology
2-12-1 Ohokayama, Meguru-ku
Tokyo 152, Japan
heat transfer augmentation, two-phase flow

M. Hirata
Department of Mechanical Engineering
University of Tokyo
Bunkyo-ku, Tokyo 113, Japan
turbulent heat transfer, instrumentation

E. M. Khapakhpasheva
Institute of Thermophysics
Siberian Branch
USSR Academy of Sciences
Novosibirsk-90 630090, USSR
general heat transfer experiments

O. Martynenko
A. V. Luikov Heat and Mass Transfer Institute
P. Brovka Street 15
220728 Minsk BSSR, USSR

F. Mayinger
Institute of Thermodynamics (A)
Technical University of Munich
Munich, FRG
interferometric and other optical techniques

D. E. Metzger
Department of Mechanical and Aerospace Engineering
Arizona State University
Tempe, Arizona 05287, USA
convective and gas turbine heat transfer

R. Viskanta
Department of Mechanical Engineering
Purdue University
West Lafayette, Indiana 47907, USA
radiation, conduction, phase change

G. Yadigaroglu
Swiss Federal Institute of Technology (ETH)
ETH-Zentrum
CH-8092 Zurich,
Switzerland
two-phase flow and heat transfer

AIMS AND SCOPE: *Experimental Heat Transfer* seeks to provide a forum for papers dealing with measurement techniques and with results of experimental studies in heat and mass transfer and in related fluid flows. The papers should contain original experimental information that enhances the basic understanding of heat and mass transfer and fluid flow problems and their applications and may include related theory, analysis, and numerical studies. The journal will consider for publication the following types of material: contributed papers, technical notes, invited papers, letters to the editor, and book reviews, the latter by invitation. All contributions will be evaluated by referees and an editor.

Editorial Office: G. F. Hewitt, Thermal Hydraulics Div., B392 Harwell Laboratory, UKAEA, Oxfordshire OX11 0RA, England; and C. L. Tien, 509 Administration Building, University of California, Irvine, CA, 92717.

Publishing, Advertising, and Production Offices: Publishing and Advertising: Hemisphere Publishing Corporation, 79 Madison Avenue, Suite 1110, New York, NY 10016-7892, (212) 725-1999; or Taylor & Francis Ltd., Rankine Road, Basingstoke, Hampshire RG24 0PR, England. Production: Hemisphere Publishing Corporation, 1101 Vermont Avenue, N.W., Suite 200, Washington, DC 20005-3521, Telephone (202) 289-2174, Susan E. Zinninger, Production Editor.

Experimental Heat Transfer (ISSN 0891-6152) is published quarterly by Taylor & Francis Ltd., 4 John Street, London WC1N 2ET UK, for Hemisphere Publishing Corporation. Annual 1989 institutional subscription £79, US $135. Personal subscription rate available to home address only US $57.

Second-class postage paid at Jamaica, NY 11431. U.S. Postmaster: Send address changes to Experimental Heat Transfer, Publications Expediting Inc., 200 Meacham Avenue, Elmont, NY 11003.

Dollar rates apply to subscribers in all countries except the UK and the Republic of Ireland, where the sterling price applies. All subscriptions are payable in advance and all rates include postage. Subscriptions are entered on an annual basis, i.e., January to December. Payment may be made by sterling check, dollar check, international money order, National Giro, or credit card (AMEX, VISA, Mastercard/Access).

Orders originating in the following territories should be sent directly to: **Australia**—R. Hill & Son, Ltd., 117 Wellington Street, Windsor, Victoria 3181. **India**—Universal Subscription Agency Pvt. Ltd., 101-102 Community Centre, Malviya Nagar Extn., Post Bag No. 8, Saket, New Delhi. **Japan**—Kinokuniya Company, Ltd., Journal Department, P.O. Box 55, Chitose, Tokyo 156. **New Zealand**—R. Hill & Son, Ltd., Private Bag, Newmarket, Auckland 1. **USA, Canada, and Mexico**—Taylor & Francis, Inc./Hemisphere Publishing Corporation, 1900 Frost Road, Suite 101, Bristol, PA 19007, USA. **UK and all other territories**—Taylor & Francis, Ltd., Rankine Road, Basingstoke, Hampshire RG24 0PR, England.

Copyright © 1989 by Hemisphere Publishing Corporation. All rights reserved. Printed in the United States of America. Authorization to photocopy items for internal or personal use, or the internal or personal use of specific clients, is granted by Hemisphere Publishing Corporation for libraries and other users registered with the Copyright Clearance Center (CCC) Transactional Reporting Service, provided that the base fee of $3.00 per copy, plus .00 per page is paid directly to CCC, 27 Congress St., Salem, MA 01970, USA.

The publisher assumes no responsibility for any statements of fact or opinion expressed in the published papers or in the advertisements. **Experimental Heat Transfer** is owned by Hemisphere Publishing Corporation.

CONTENTS OF VOLUME 2

NUMBER 1

1 Heat Transfer by the Annular Impinging Jet **Hiroshi Maki and Akira Yabe**

13 Dynamical Behavior of Natural Convection in a Double-Loop System **P. Ehrhard, Ch. Karcher, and U. Müller**

27 An Interferometric Investigation of Open-Cavity Natural-Convection Heat Transfer **S. S. Cha and K. J. Choi**

41 A Scientific Approach to Thermophysical Property Data for Fluids **W. A. Wakeham**

59 Direct Measurements of the Turbulence Heat Flux in a Large Rectangular Air Cavity **A. Bowles and R. Cheesewright**

71 Shifted Crossed-Beam (SCB) Method for the Measurement of Local Values of the Characteristic Parameters in a Dispersed Two-Phase Flow **Akira Kariyasaki and Tohru Fukano**

89 Announcement

NUMBER 2

91 Infrared Radiation Properties of Ethylene **A. Tuntomo, S. H. Park, and C. L. Tien**

105 Effect of Shrouding on Air Natural-Convection Heat Transfer from Staggered Vertical Fins **G. Guglielmini, E. Nannei, and G. Tanda**

113 Cylinder Cross-Flow Heat Transfer in Drag-Reducing Fluid **J. W. Hoyt and R. H. J. Sellin**

129 A Theoretical and Experimental Study of Direct-Contact Condensation on Water in Turbulent Flow **G. P. Celata, M. Cumo, F. D'Annibale, G. E. Farello, and G. Focardi**

149 Use of Physical Quantities, Units, Mathematics, and Nomenclature in Heat Transfer Publications **Yon R. Mayhew**

NUMBER 3

173 SILEP-1 Computer System for Measuring Electrical Conductivity of Plasma in the Channels of MHD Generators **F. M. Oberman**

179 Multifunctional Laser Facility with Photoelectric Recording for Plasma Diagnostics **L. N. Pyatnitsky, G. G. Yakushev, and F. M. Oberman**

189 Radiative Flux Measurements in a Sooty Pool Fire **Larryl Matthews and Randy Longenbaugh**

201 Turbulent Heat Transfer and Pressure Drop Measurements for Viscoelastic Flows through Rectangular Passages **B. K. Rao**

215 A Nonintrusive Technique for Concentration Distribution Measurement in Enclosures **C. Gau and K. H. Wu**

227 Turbulent Heat Transfer Performance of Newtonian Fluids in Asymmetrically Heated Rectangular Channels **B. K. Rao**

237 Measurement Techniques for Horizontal Flow Boiling Heat Transfer with Pure and Mixed Refrigerants **D. S. Jung, M. McLinden, and R. Radermacher**

NUMBER 4

257 Numerical Simulation and Interpretation of the European In-Pile Core Debris Bed Experiment **A. K. Stubos, J.-M. Buchlin, C. Pérez Caseiras, and C. Joly**

279 Temperature Measurement in Liquid-Liquid Spray Columns **F. Lin and J. D. Ford**

291 Combined Effects of Rib Angle-Of-Attack and Pitch-To-Height Ratio on Mass Transfer from a Surface with Transverse Ribs **M. K. Chyu and L. X. Wu**

309 Experimental Determination of Radiative Properties for Scattering Particulate **J. A. Menart, H. S. Lee, and R. O. Buckius**

333 Heat Transfer and Velocity Characteristics of Single- and Two-Phase Flows in a Subsonic Model Gun **A. F. Bicen, L. Khezzar, M. Schmidt, and J. H. Whitelaw**

353 Velocity Distribution and Turbulence Structure of Fully Developed Flow in a Curved Tube **Yoshiyuki Aoyama and Kozo Futagami**

371 Announcement

FOLLOWING PAGE 371:

Title Page to Volume 2
Contents of Volume 2
Author Index to Volume 2
Subject Index to Volume 2